Chaos and Violence: A LONGSCAN Analysis of the Effects of Childhood Environmental Instability

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Abstract

Objectives – Using data collected through the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN), this study compares the strength of relationships between adolescent violence perpetration as it is associated with both experiences of child maltreatment as well as childhood environmental instability. The study seeks to demonstrate that instability predicts subsequent aggression more strongly than previous victimization and that a higher intensity of chaos throughout one's youth increases the likelihood of perpetrating violence in adolescence.

Methods – Researchers followed LONGSCAN participants from age four (or earlier) to eighteen years old (n=1354). Using Chi Square tests, predictive probabilities, and logistic regression, this study compares the relationships of child maltreatment to adolescent aggression and environmental instability to adolescent aggression. Indicators of household/environmental instability and violence perpetration were formed using instruments and questionnaires from interviews administered in adolescence. This analysis evaluates the association of instability and violence instigation more thoroughly by considering the effect of gender, the dose-response relationship, and the recency effect.

Results – Multiple shifts in a young person's environment, such as moving homes, changing schools, and/or shifts in caregivers such as through parental separation or foster care, increases a teenager's likelihood of resorting to aggression or violence (OR: 1.68) whereas experiencing physical or sexual abuse or witnessing abuse in one's household as a child is not significantly associated with this outcome. Furthermore, as chaos increases, the odds of committing violent acts correspondingly rise. Gender moderates this relationship, as males are at greater risk of violence perpetration after experiencing an unstable childhood.

Conclusions for practice– Exposure to chaos in one's family, living situation, and/or academic institutions during childhood can have detrimental effects on adolescents' wellbeing. This factor should be considered within therapy and behavioral modification programs.

Problem Statement

The toll of violence in the United States is palpable, and it disproportionately affects young people both as victims and as perpetrators. In 2013, homicide became the third leading cause of death for youth aged 15-24 and the fifth leading cause of death for children between the ages of 10 and 14.[1] Both these age groups are also highly impacted by suicide rates, with this being the second leading cause of death for 15-24 year olds.[1] Furthermore, about 17% of all serious violent crimes (aggravated assault, rape, and robbery) committed in the same year were perpetrated by adolescents between the ages of 12 and 17 years old.[2]

Since the 1960's, psychologists and social scientists have looked to violence perpetrators' childhood experiences to provide potential answers as to what catalyzes increased amounts of violent acts at a later age.[3] Child maltreatment, a suggested stimulus to violence perpetration now highly supported by the literature, can be defined differently among assorted sources and studies. Most commonly, the term maltreatment refers to physical, sexual, and/or emotional abuse or neglect of a child by an adult or person at least five years older. Neglect, another term with classification fluctuations dependent on the study, is the most prevalent type of maltreatment. Exposure to maltreatment in childhood is far too common in the United States, with the National Incidence Study (NIS) reporting over 2.9 million children experiencing maltreatment between 2005 and 2006.[4] Within this study, about 44% of those experiencing maltreatment had been physically, emotionally, or sexually abused whereas 61% had been neglected. Though Child Protective Services substantiated

reports of child abuse or neglect of only 9.1/1000 children nationally in 2013,[5] NIS estimates that only about 32% of the children cases experiencing Harm Standard maltreatment were investigated by CPS.[4] Furthermore, according to a cumulative prevalence study of child maltreatment looking substantiated cases of maltreatment between 2004 and 2011, 12.5% of all U.S. children will experience maltreatment at some point during their lives.[6] This equates to one in every eight children nationally, with almost 80% being cases of neglect, and black children experiencing maltreatment at twice the rate of white children. Another recent but less comprehensive study using the National Longitudinal Study of Adolescent Health (Add Health) also found high prevalence of maltreatment. Using a nationally representative sample of over 15,000 students between 7th and 12th grade, the study found that 41% had been exposed to neglect, 14% exposed to physical abuse (defined as slapping, hitting or kicking by an adult) more than three times during their lifetimes, and about 5% had been victims of sexual abuse.[7] Physical abuse can result in immediate consequences such as injury and death – an estimated 1,520 of the young maltreatment victims in 2013 CPS reports died[5] – as well as have negative long-term consequences for survivors such as poorer emotional development and health. An extensive systematic review of 124 research articles exploring these long-term outcomes of child maltreatment revealed the amassed knowledge; "Statistically significant associations were observed between physical abuse, emotional abuse, and neglect and depressive disorders … drug use…suicide attempts…and sexually transmitted infections and risky sexual behavior."[8]

A Review of the Literature

Research into the association between violence victimization and perpetration was initiated by medical doctor GC Curtis after he wrote an article published in 1963 positing on a mostly theoretical basis that exposure to child abuse leads to violent and aggressive behavior in adulthood.[3] This cycle-of-violence theory, supposing that abused children would resort to violence in adulthood due to a familiarity and dependence upon it, spurred further research, mostly as retrospective queries of convicted violent offenders.[9] These studies, limited in scope, failed to provide causality and authors clamored for more research to be done.

Eventually, a prominent researcher in the field, Cathy Widom, funded by the National Institutes of Justice, performed a distinguished longitudinal and prospective study of 1,575 youth followed into adulthood.[10] Selected participants were those who had been victims of substantiated child abuse or neglect cases between the years 1967 and 1971 and controls matched by age, sex, race, and family SES. This study was also unique in that it differentiated types of child maltreatment, delineating the four types still used today: physical abuse, sexual abuse, emotional abuse, and neglect. Widom found that survivors of childhood abuse and neglect had 29% increased odds of being convicted for violent offenses.[10]

A more recent, massive scale inquiry relied upon the scaling of adverse childhood experiences (ACE) as predictive of adolescent delinquency.[11] Adverse childhood experiences are measured as encountering neglect, physical, emotional, or sexual abuse or bearing witness to intimate partner violence, as well as having been

raised by a parent who was divorced/separated, imprisoned or struggling with substance addiction.[11] This study collected the self-reported personal histories of 136,549 Minnesota youth in 6th, 9th, and 12th grades on the presence of specific ACEs as well as delinquency, which was listed as bullying, physical fighting, dating violence, carrying weapons on school property, or self-directed violence. The scholars found significant associations between each type of ACE and adolescent delinquency, but also found that each additional ACE increased the risk of violence perpetration 35% to 144%.[11] Though a well-executed and respectable study that introduced the field to the impact of ACEs, it was plagued by some notable limitations. The researchers did not specify whether probability sampling was used, and the Minnesota youth were not nationally representative, especially racially. Furthermore, they failed to present any moderating variables that could increase the odds of positive outcomes among the participants.

Subsequent and ongoing studies have similarly found increased rates of violent behavior in males and females who have been maltreated as children, and some studies have established a stronger association of this outcome in females who were maltreated.[12-15] Scholars began to stratify studies, exploring moderating variables such as age at abuse, duration of abuse, type of abuse or neglect, and child and family demographics.[15-16] Another study on the differential effects of child maltreatment examined the variation in outcomes between children's witnessed violence versus victimization.[13] This link between witnessed violence and experienced victimization is a

thorny complication oft overlooked, yet further research has demonstrated a comorbidity of child abuse and children's recollection of witnessing household IPV.[16-19]

One important limitation of this literature is that many studies consider delinquency and/or violence perpetration only as measured through the justice system, juvenile or adult. This introduces bias presented in that the studies only consider extreme forms of violence (usually aggravated) and require that perpetrators are caught in order to be counted as having the outcome.[10, 12, 14-16, 24-25]

As studies became more extensive, researchers realized that although many analyses had demonstrated a higher risk of adolescent and/or adult perpetration of violence among persons who were maltreated as children, having certain factors, known as resilience factors, present could moderate the effect of this exposure.[21-24] Family cohesion, relationships with peers, and strong educational aptitude, for example, were each shown to be protective elements when assessing predicted violent behavior among abused and formerly abused children.[21] Though strong neighborhood and family ties were established as potential resilience factors, rarely are their opposites, community transience and household instability, evaluated as potential contributors to the outcome of latter violence perpetration.

One study evaluating adult violence indicators in relation to history of childhood maltreatment tested environmental instability as a mediating pathway between maltreatment and subsequent violence perpetration in both genders.[14] Topitzes et al. used the Chicago Longitudinal Study (CLS) and found that environmental instability, defined in their study as out-of-home placements and school mobility, did serve as a

significant pathway to subsequent violence perpetration among males ($p<0.00$), but not females ($p=0.956$). This theory-informed research incorporated environmental instability as a measurable proxy for adult relationship disruption during one's youth.

Experts in psychology, criminal justice, and public health have evaluated the role of instability in children's health and development for almost two decades. Limiting the literature's impact, however, is its lack of definitional uniformity and accompanying conceptual and operational abstractness. Instability has most often been defined as one of or some combination of the following variables: parent/caregiver separation, new caregiver unions (such as a parent remarrying), changes in residence, schools, or communities, caregiver substance abuse or imprisonment, and in some studies instability's definition even includes physical or sexual abuse or neglect.[26-33] In addition to broad and diverse definitions of childhood instability, studied outcomes measured in association with this instability also vary. Researchers have evaluated the effect of an unstable or unsafe home life on child behavior, as defined by internalizing behaviors (such as reported feelings of anxiety or depression, etc.), externalizing behaviors (such as reports of smoking, alcohol or drug use, destruction of property, etc.), teachers' reports on children's behavior in class, on grades, on juvenile delinquency, and on age of sexual debut, among other outcomes. With the exception of Topitzes et al.,[14] few have looked specifically at nonsexual violence perpetration as the proposed outcome.

Research Question

Merging this extensive network of literature, this study will use LONGSCAN (Longitudinal Studies of Child Abuse and Neglect) data to compare two proposed

pathways to adolescent violence perpetration: experiencing violence in the form of child maltreatment or childhood witnessing of intimate partner violence (IPV), and environmental chaos or household instability which is measured as residential and school mobility and changes in caregivers. Hypothesizing that chaos serves as a stronger predictor of adolescent violence, this research also deliberates on the dose-response relationship of chaos to violence perpetration as well as the effect that gender plays, resulting in a stronger association among males. Lastly, this study hypothesizes that the *recency effect* will play a part in the chaos-aggression association, such that those adolescents who experienced environmental instability in a more recent epoch of their lives will be more likely to have aggressive tendencies. The final regression model will also account for potential confounding variables such as race and site.

Hypothesis A: Childhood exposure to chaos is more strongly associated with adolescent violence perpetration than exposure to child maltreatment, and it is moderated by gender.

Hypothesis B: The association between chaos and violence perpetration will strengthen according to number and recency of environmental upheavals.

Theoretical Bases

This research question derives heavily from relevant theories. Similar to a previous LONGSCAN study of the association between child maltreatment and adolescent weapon carrying, this study draws from a self-preservation theory.[34] That is, as children are victimized or they witness violence directed toward or from their family members, their perceived vulnerability will increase, subsequently heightening their

sense of self-preservation. By the same token, as children are separated, through environmental upheavals, from trusted adults, whether caregivers, teachers, or other adults in the community, they learn to become more self-reliant and a sense of self-preservation can be even stronger without a stable home base or safety net.

The *ecobiodevelopmental* framework proposed by pediatricians Jack Shonkoff and Andrew Garner[35] also keenly informs this particular study. According to this theory, the debate over the influence of nature versus nurture has become outdated and replaced. In its stead, "beginning prenatally, continuing through infancy, and extending into childhood and beyond, development is driven by an ongoing, inextricable interaction between biology (as defined by genetic predispositions) and ecology (as defined by the social and physical environment)."[35,p.e233] Important components of this theory utilized by the current research study include the developmental timing of the experience of chaos and the intensity of the chaos.[28]

Relevance to Maternal and Child Health

This analysis embraces a vulnerable and often overlooked population in the field of maternal and child health – adolescents, especially adolescent males. A sphere habitually hyper-focused on preventable diseases, prenatal care, maternal-infant bonding including breastfeeding, and young children, maternal and child health frequently overlooks violent injury, the criminal and juvenile justice system, and the young people caught in webs spun from social and ecological circumstances since infancy. For reformations within the education and justice systems to be valuable to adolescents and to be effective in breaking the cyclical nature of violence, they must be

rooted in public health research and concerted efforts to improve affected children's and adolescents' wellbeing even when these young people are marginalized as criminals or victims.

Methods

Dataset

This study utilizes the Longitudinal Studies of Child Abuse and Neglect, or LONGSCAN dataset. LONGSCAN data was collected over nearly two decades with a total of 1,354 participants over five different geographical sites in the U.S. LONGSCAN used a non-probability sample of non-compensated families comprised of a child and his/her caregiver(s). The participants enrolled were four year olds who were recruited after being designated "at risk" for abuse by a governmental organization or whose families had been reported to CPS, whether or not reports were substantiated. Participants and their caregivers were interviewed face to face every two years, and short phone interviews with caregivers were used to follow up with the family units during the off years.

All LONGSCAN participants who were followed up until their 16- or 18-year-old interviews were eligible for this study. Participants were eliminated if they were lost to follow up before their final interviews or were missing data for their exposure to abuse (n=0), exposure to chaos (n=555), and violence perpetration data (n=23) , leaving a final sample size of 776 participants for the initial part of the study.

Measures

The outcome, violence perpetration, was scored using a combination of questions from two separate instruments: the adolescent's self-reported behavior (Youth Self-Report Form: Behavior [YBPA]), and a questionnaire to the participant looking specifically at delinquent and violent behavior (DELA) administered during either the participants' 16-year or 18-year old interviews. The YBPA scored statements between 0 and 2, with 0 being never/not true, 1 = sometimes/somewhat true, and 2=very true or often. This researcher utilized eight statements on the YBPA instrument indicating specific aggressive behaviors such as "I [the participant] set fires" or "I [the participant] threaten to hurt people." The DELA assessment looked at participants' responses to questions regarding how many times in the last year they had acted violently, such as "attacked someone with a weapon or with the idea of seriously hurting or killing them" and were originally rated on a non-continuous scale of 0-3, but for the purposes of this study, nine statements which pertained to violent or aggressive behavior were pulled from this assessment and were recoded into binary responses with "0" for Never or "1" for Ever. A final dichotomous outcome variable, violence perpetration, was then generated from the combination of the YBPA and DELA assessments, the exact questions/statements from which can be seen in Appendix A. For further investigation, the violence outcome was broken down into three subcategories: violence toward other people, violence toward property, and violence toward self (see Appendix A).

Exposure to chaos, or household/environmental instability (used interchangeably here) was defined using the Household and Caregiver Stability (STBA)

tool, an instrument measuring major life upheavals during three different age epochs.[36] The tool presents a total number of changes in residences, caregivers, and schools (from "1" to "5 or more") throughout a participant's early, middle, and late childhood. A response of 1, indicating no change in the household or school was recoded as "0", and then the totals for each epoch were summed. The results of this summed indicator ranged from 0 to 15, and participants who scored greater than six per epoch were considered exposed to chaos for that epoch, while those who scored six or less were designated unexposed. In the absence of an operational definition of chaos in public health literature, this threshold was theoretically derived. However, the distribution of exposure supports the threshold of more than six incidences of upheaval during one age period as being excessive and deleterious. The three subsets of chaos according to age were then combined to form one independent dichotomous variable measuring any exposure to chaos/instability at any age period during one's lifetime. In other words, if any participant scored greater than a six on either the early childhood, middle childhood, or late childhood Household Caregiver and Stability tool, (s)he was considered "exposed to chaos" for the final variable measuring chaos at any point.

A score of greater than six on the scale would either mean that in a roughly five year period, a child either experienced more than two shifts in school locations, homes, and caregivers, or experienced up to four or more upheavals in one of those categories as well as some change in the other two categories. As previous studies and literature indicated that negative outcomes increase as negative experiences culminated, this research attempts to decrease measurement error and mistaken conclusions by

differentiating between natural life changes and excessive instability at an unmistakably high level, which equates to about one standard deviation above the mean. The exact questions summed and scored as well as the distribution of exposure at each epoch can be seen in Appendix B.

To further explore the dose-response relationship of chaos to violence perpetration, three other variables were created through the same assessment (STBA) and utilized in this study. These binary variables were created in response to the limitation of summing the scores of all three potential sources of upheaval to create one chaos scale. For example, the researcher wanted to delineate any cases where a participant scored a five in any one of the categories, meaning (s)he had experienced five different residency changes, bounced from school to school five times, or had lived with five different caregivers, within a five year epoch. Therefore, the researcher created binary variables to designate any participant who scored a three, four, or five in any particular category (changes in house, school, or caregiver) during any epoch (see Appendix B).

To evaluate presence of abuse, researchers collected both written reports by Child Protective Services (CPS) as well as caregiver reports and children's self-reporting through biennial face-to-face interviews. As suggested by previous LONGSCAN researchers, the inclusion of both of these information sources provides the most accurate history of maltreatment.[37] Exposure to abuse was defined as having any report or allegation, either by CPS, caregivers, or self-reported by the young participant, of experiencing physical abuse or sexual abuse or of witnessing interpersonal violence in

their own home. This research seeks to distinguish abuse as a clear exposure to violence, either through victimization or through witnessing violent acts toward loved ones. For this reason, neglect was excluded as a form of abuse. As previous research has demonstrated that allegations of maltreatment and maltreatment substantiations yield comparable outcomes, [37-38] this study considers allegations of abuse by CPS (as measured in the derived file M_SDM[36]) or participants' self-reports of lifetime abuse (as measured in LPAA and SALA[36]) as their having been exposed to violence.

Based on previous literature, gender, race/ethnicity, and site were included as potential confounders in the final regression model. Participant gender and race and ethnicity were collected through the Master Participant ID list. Race was listed as either African American, white, mixed race, Asian, Native American, or other, and Hispanic ethnicity was included. Due to extremely small percentages of participants listed as Asian, Native American, and other, these categories were combined into one "other" category. Site, or the geographic city in which the participant lived during the study, was included as a potential confounder due to the varied environments, including policies and neighborhood settings, and the different study recruitment techniques at each location.

Analysis

Descriptive statistics were calculated for the entire sample, and reported in Table 1. Pearson Chi Square tests were performed on each variable with the outcome. Subsequently, a crude bivariate logistic regression was conducted between each of the two exposures, environmental instability at any point in childhood and childhood

maltreatment, with violence perpetration. After dividing the participants into four exposure type groups (Chaos Only, Abuse Only, Double Exposed, Unexposed), predictive probabilities were measured using the VCE margins model. Intensity and recency of exposure to chaos were measured using bivariate regressions. In the formation of a final regression model, first gender was assessed as a moderator using the Breslow-Day Test of homogeneity at an a priori criteria of (p=0.05). Next, adjusted multivariate logistic regression models were formed to establish significance levels when accounting for all potential confounding and moderating variables. Initial data cleaning was done in SPSS 23 and further data cleaning and all analysis was performed using Stata SE 14.

Results

Descriptive Statistics

The final sample, consisting of 776 participants, was comprised of more than 54% females. African American was the race most highly represented, and over half of the total sample had been exposed to chaos at some point in their lives whereas over two-fifths had been exposed to some type of maltreatment. The demographic breakdown of the sample can be seen in Table 1.

An initial evaluation of the relationship between chaos and violence perpetration using Pearson's Chi Square test indicated a statistically significant association ($p<0.00$), as did the Chi Square test associating exposure to physical abuse during childhood and adolescent violence perpetration. Results for these associations are shown in Table 1.

Table 1: Demographic Report and Chi Square Results of Sample Demographics

	Total in Sample		Perpetrated Violence During Adolescence		
	N=	Percentage of Total Sample	N=	Percentage of Violent Adolescents	Pearson's Chi Square Probability
Total	776		403		
Race/Ethnicity					
White	194	25	103	25.6	
Black	424	54.6	218	54.1	
Mixed Race	97	12.5	54	13.4	
Hispanic	49	6.3	26	6.5	
Other	11	1.4	2	0.5	
Gender					***
Male	352	45.5	207	51.4	
Female	424	54.6	196	48.6	
Type of Abuse Experienced					
Physical Abuse	287	37.0	170	42.2	***
Sexual Abuse	154	19.8	80	19.9	
Witnessed IPV	71	9.1	44	10.9	*
Age of Chaos Experienced					
Early Childhood	183	23.6	115	28.5	***
Middle Childhood	270	34.8	168	41.7	***
Late Childhood	398	51.3	233	57.8	***
Ever	464	59.8	265	65.8	***

Source: LONGSCAN Age 16-18. *= p<0.1, **= p<0.05, ***= p<0.01. Race/Ethnicity cateogory "Other" includes Native American, Asian, and Other

Hypothesis 1

Subsequently, a logistic regression model demonstrated that participants who had been exposed to a period of environmental instability were 1.68 times as likely to instigate aggression in adolescence as their counterparts in stable environments (95% CI: [1.26,2.24]). On the other hand, a logistic regression model measuring the association between any history of physical or sexual maltreatment or witnessing IPV

and subsequent perpetration of violence did not yield statistically significant results (p=0.086).

Results from the VCE Margins Model, displayed in Table 2, establish that when participants were exposed to chaos and not to abuse, the difference in predictive margins for violence perpetration 0.8 percentage points higher (95% CI: [0.48, 0.61]) than among those exposed to abuse and not to chaos. Furthermore, among those who were exposed both to maltreatment and instability, the probability of violence perpetration was 1.6 percentage points higher than the probability that participants unexposed to either maltreatment or instability would act violently (95% CI: [0.53, 0.65]).

Table 2: VCE Predictive Margins for Violence According to Exposure Type

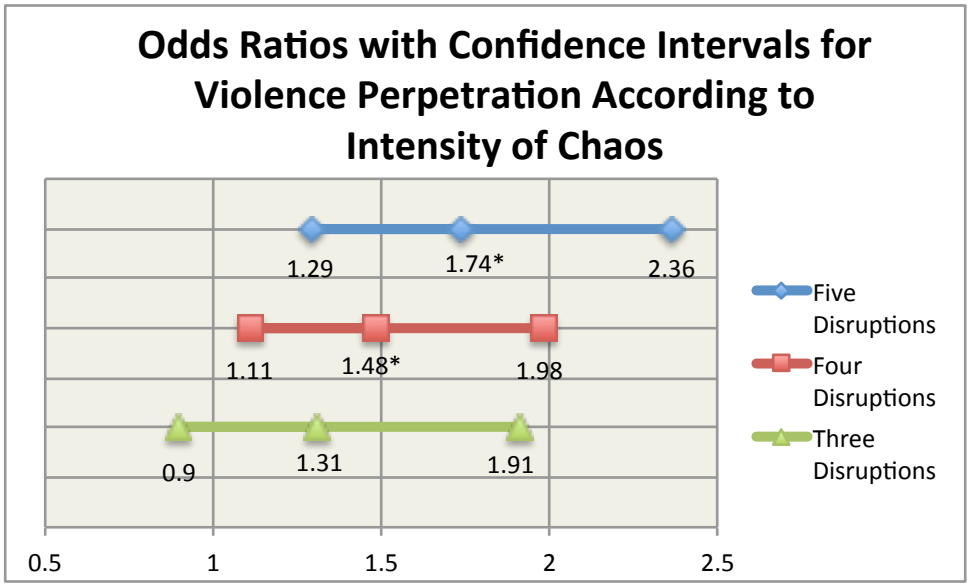
Predicted Probabilities Model		
Exposure Type	Predicted Probabilities	95% C.I.
Unexposed	0.433	(.366, .500)
Only Chaos	0.547	(.482, .612)
Only Abuse	0.461	(.364, .558)
Chaos and Abuse	0.593	(.531, .655)
Source: LONGSCAN Age 16-18		

Hypothesis 2

Examining the effect that intensity of chaos had on the measured externalized behavior validates the idea that during any time period in youth, experiencing compounding upheavals in any one area of a young person's life, be it their place of residence, academic setting, or caregiver presence, can indeed lead to increased reliance on aggression during adolescence. Among those participants who experienced

five or more shifts in one category (residence, school, caregiver) at one epoch or another (n=264), the odds of perpetrating violence jumped to 1.74 (95% CI: [1.29, 2.36]). This odds ratio drops according to frequency of upheaval, as displayed in Figure 1.

Figure 1: Aggression or Violence According to the Number of Upheavals in Any One Category (School, Residence, or Caregiver) at Any Time Period



***p<0.01**

The presence of environmental instability during each epoch was significantly associated with adolescent aggression, though the epoch that formed the highest association was during middle childhood, or six to eleven years old. This counters the hypothesis that the likelihood of violence instigation would increase when the presence of environmental instability is more recent. Interpretation of these results heeds caution, however, as a higher proportion of participants reported increased upheaval during late childhood than they did during the other two epochs.

Gender

Though previous studies demonstrate the relationship between being abused as a child and perpetrating violence later in life as being stronger in females than in males, this study found exposed females to be less likely to perpetrate violence than exposed males (OR 0.60, 95%CI [0.45, 0.80]). Furthermore, when tested as a moderator of the association between exposure to chaos and adolescent violence perpetration using the Breslow-Day test of homogeneity, gender was found to significantly influence this association (p=0.045). Results were then stratified according to gender. Among the males in the sample, adolescents exposed to environmental instability were 2.4 times as likely to instigate violence than those who had relatively stable backgrounds (*adjusted* - 95%CI: [1.55, 3.76]). Data also suggested that girls were more likely to be violent toward themselves (OR: 2.94), either through suicide attempts or ideation, but the results were not statistically significant (p=0.055) and had a wide confidence interval, perhaps due to low numbers of participants reporting self-directed violence. A descriptive table displaying the occurrences of abuse types, epoch of chaos experienced, and type of aggression as stratified by gender can be found in Table 3.

Table 3: Number and percentage of participants experiencing exposures and outcome stratified by gender

	Male		Female	
	N=	% of Total Males	N=	% of Total Females
Type of Abuse Experienced				
Physical	134	38.1	153	36.1
Sexual Abuse	38	10.8	116	27.4
Witnessed IPV	34	9.7	37	8.7
Chaos Experienced During…				
Early Childhood	74	21	109	25.7
Middle Childhood	118	33.5	152	35.9
Late Childhood	177	50.3	221	52.12
Violence Perpetration Type				
Toward Others	89	25.6	69	16.9
Toward Self	16	4.6	22	5.4
Toward Property	59	16.9	54	13.2
Any	207	58.8	196	46.23
Data Source: LONGSCAN Age 16-18				

Confounding Variables

Due to its heavy appearance in the literature, race was included in the final model as a potential confounding variable to this study. Because recruiting techniques for the study varied according to site, site was also included as a potential confounder. Race and site were assessed as confounders using dummy variables. Perhaps due to the low sample size or continuity in participants' backgrounds, none were found to be significant confounders in the association of chaos and adolescent violence perpetration. Finally, multivariate logistic regression was performed using all variables discussed and stratified by gender. The results of both the crude and adjusted odds ratios for all variables studied can be found in Table 4.

Table 4: Adjusted and unadjusted multivariate logsitic regression results stratified by gender

MALES

	Violence Perpetration Reported in Adolescence *Unadjusted*			Violence Perpetration Reported in Adolescence *Adjusted*		
	OR	**95% CI**	**P-Value**	**OR**	**95% CI**	**P-Value**
Household Instability at Any Point						
Exposed	2.39	(1.55, 3.70)	***	2.41	(1.55, 3.76)	***
Unexposed	-----	---		------	---	
Race/Ethnicity						
Black	0.62	(0.37, 1.05)		0.6	(0.32, 1.10)	
White	1	-----		1	-----	
Mixed Race	0.76	(0.37, 1.55)		0.74	(0.35, 1.55)	
Hispanic	0.79	(0.31, 2.02)		0.79	(0.29, 2.18)	
Other	omitted	-----		omitted	-----	
Site						
Northwest	1.2	(0.60, 2.38)		0.98	(0.45, 2.13)	
Southwest	1.27	(0.63, 2.59)		1.05	(0.48, 2.29)	
East	0.9	(0.45, 1.80)		1.13	(0.55, 2.32)	
Midwest	1.21	(0.57, 2.56)		1.13	(0.50, 2.53)	
South	1	----		1	-----	

Source: LONGSCAN, Age 16-18. *p<0.1, **p<0.05,***p<0.01, OR = odds ratio, CI = confidence interval
Results from Race/Ethnicity category "Other" automatically omitted due to low population

FEMALES

	Violence Perpetration Reported in Adolescence *Unadjusted*			Violence Perpetration Reported in Adolescence *Adjusted*		
	OR	**95% CI**	**P-Value**	**OR**	**95% CI**	**P-Value**
Environmental Instability at Any Point During Childhood						
Exposed	1.31	(0.89, 1.95)		1.3	(0.86, 1.96)	
Unexposed	-----	---		------	---	
Race/Ethnicity						
Black	1.35	(0.84, 2.15)		1.28	(0.76, 2.16)	
White	1	-----		1	-----	
Mixed Race	1.49	(0.74, 2.99)		1.29	(0.63, 2.64)	
Hispanic	1.22	(0.52, 2.91)		0.98	(0.40, 2.42)	
Other	0.36	(0.07, 1.77)		0.31	(0.06, 1.54)	
Site						
Northwest	1.02	(0.55, 1.90)		1.04	(0.53, 2.06)	
Southwest	1.41	(0.78, 2.56)		1.41	(0.75, 2.67)	
East	1.19	(0.64, 2.20)		1.13	(0.60, 2.13)	
Midwest	2.15	(1.13, 4.10)	**	2.12	(1.08, 4.16)	**
South	1	----		1	-----	

Source: LONGSCAN, Age 16-18. *p<0.1, **p<0.05,***p<0.01, OR = odds ratio, CI = confidence interval

Discussion

Policy Implications

Decades of rigorous scientific literature have validated the idea that exposure to violence during childhood through personal victimization or witnessing of IPV begets the subsequent execution of violence and aggression. However, this study finds that even among those adolescents who had been exposed to violence as children, only 46% of teenagers who had grown up in a stable household perpetrated violence. On the other hand, of those maltreated individuals who had been exposed to an unstable environment, 58% were perpetrating violence at age 18. Even controlling for confounding factors, boys who have suffered much upheaval during any period of time in their lives were 2.41 times as likely to have violent tendencies as those who did not experience chaos. In providing therapy and developing programs targeting children who have experienced and/or witnessed domestic abuse, household instability needs to be considered as a major risk factor to be addressed.

This research indicates that coordinating services such as the juvenile justice, education, and child welfare systems must focus on providing ongoing and consistent environmental support while minimizing school and residence disruption when dealing with juvenile offenders as well as children and youth who have been removed from their homes after experiencing maltreatment. Providing these young people with as much stability as possible, while also directly addressing their tendency toward self-reliance, as was reinforced through unpredictable environments during formative years,

can offer support professionals an opening to teach this demographic effective coping mechanisms, potentially decreasing their reliance on aggression.

This research also has broad implications for immigrant, farmworker, and refugee populations. These populations experience increased housing disruption and subsequently school mobility.[39-41] Migrant and farmworker communities may have stronger familial ties but are at higher risk due to fears of deportation, or parental separation in the event that parents are deported and children are admitted into the U.S. foster care system.[41] Another demonstrably vulnerable population is that of homeless children, a historically high one in thirty children in this country as of 2013.[42] Even among those who are not homeless, mobility is more endemic among populations who are living at or below the poverty level. For example, whereas only 10% of the population living at 150% of the poverty level and above changed residences in 2008, 24% of those living below the poverty level were obliged to move.[40]

Strengths and Limitations

In measuring maltreatment through CPS allegations and self-reports rather than substantiations, this study sample eliminates a weakness present in much of the literature in which participants are only selected if CPS had substantiated maltreatment. The inclusion of both sources of abuse allegation helped reduce potential sampling bias resulting from this overtaxed agency requiring proof of physical injury or witness corroboration in order to substantiate a claim, thereby substantiating only some of the most extreme cases or the most socially supported children. Furthermore, though the

majority of public health studies pertaining to adolescent behavior or violent offending measure their outcome through the criminal justice system, this study overcomes limitations associated with such a measure by utilizing self-reports to measure violent behavior and thereby capturing aggression that has necessarily been noticed or prosecuted by law enforcement. This measurement also helps to equalize this study's outcome racially, as African Americans are disproportionately targeted by the U.S. criminal justice system.[43-44]

This study is also unique due to its longitudinal nature, allowing it to establish temporality and eliminate recall bias that can plague studies of juvenile delinquents or adult violent offenders who are retroactively recalling childhood events. Moreover, this study provides a previously unexplored glimpse into the world of chaos and instability as it compares to childhood maltreatment in factoring into subsequent aggression. Further research in this area is invaluable when considering the health outcomes of vulnerable populations such as those children exposed to abuse, refugees, children in special circumstances such as temporary homelessness having a caregiver in the military, and others with highly unstable home environments.

Despite its strengths, this study has several limitations that should be considered when interpreting results. Primarily due to the niche nature of this field of research, the threshold criteria for childhood chaos has not been supported by previous scientific literature. This complicates the task of differentiating between extreme chaos versus natural life changes. It is important to note that few studies on instability have recognized the gravity of changing schools as it pertains to children's wellbeing outside

of academic success. Even in the case where a child's home life remains stable, a constant shifting of periphery adults in a young person's life can destabilize his/her social networks, decreasing social capital and increasing one's likelihood of resorting to violence. As the field of public health begins to formulate a cohesive and operational definition of childhood instability, this researcher encourages the consideration of school mobility as a component of this definition.

Another limitation stems from the nature of the study and the length of data collection. The LONGSCAN site-specific samples were selected largely based on prior exposure to maltreatment and/or high risk of future maltreatment. Thus, when considering statistical modeling, the decreased variability of abuse exposure can bias association between maltreatment and any outcome. Caution is warranted when concluding that the association between chaos and violence perpetration is necessarily stronger that that between abuse and violence, especially when neglect has been excluded as a confounder. Being longitudinal, it also leaves room for biased results as participants with higher rates of unstable households may be less likely to remain in the study due to relocation than those with stable households and environments. Both the small sample size (N=776) and small final proportion of the total of original LONGSCAN participants included in this study after those with missing data were eliminated leave the study open to sampling bias and make stratification by confounding and moderating variables problematic at times.

In addition to distinctly defining childhood environmental chaos, subsequent research in this area of public health should break down the effects of instability to

examine which type of upheaval has a more detrimental effect on an individual's behavior and wellbeing and what type of resilience factors may exist. It should also examine the role of child and youth directed services that can mitigate the negative effects that the experience of an unstable home life can have, as well as beneficial school policies regarding expulsions and behavior-related transfers.

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Appendix A:

Outcome – Aggression/Violence
Used DELA and YBPA

YBPA Questions: (Only used answers from visit 18)
18. I deliberately try to hurt or kill myself.
20. I destroy my own things.
21. I destroy things belonging to others.
37. I get in many fights.
57. I physically attack people.
72. I set fires.
91. I think about killing myself.
97. I threaten to hurt people.

Scale:
0 = Not true
1 = Somewhat or
sometimes true
2 = Very true or often
true

Self-Violence = 18 OR 91 ≥1
Violence Toward Others = 37 OR 57 OR 97 ≥1
Violence Toward Property = 20 OR 21 ≥1

DELA: (Used either 16 or 18 interview)

1. How many times in the last year have you carried a hidden weapon?
5. Purposely damaged or destroyed property that did not belong to you, (for example, breaking, cutting or marking up something)?
6. Purposely set fire to a house, building, car, or other property or tried to do so?

20. Attacked someone with a weapon or with the idea of seriously hurting or killing them?

21. How many times in the last year have you hit someone with the idea of hurting them (other than the events you just mentioned)?

22. How many times in the last year have you used a weapon, force, or strong-arm methods to get money or things from people?

23. Thrown objects such as rocks or bottles at people (other than events you have already mentioned)?

24. Been involved in gang or posse fights?

26. Physically hurt or threatened to hurt someone to get them to have sex with you?

Scale:
0 = Never
1 = One or two times
2 = Between three and
nine times
3 = 10 or more times

Measured a sum as well as indicator variables. (Only used indicators.)

Violence Toward People = 20,21,22,23,24, or 26 ≥1
Violence Toward Property = 5 or 6 ≥1
Any Violence = any of the questions ≥1 (included carrying weapons due to the nature of violence potential here)

Appendix B:

Stability of Caregiver and Residence (STBA)
Adjusted Scale: 0=1*, 2=2, 3=3, 4=4, 5=5 or more

Early Childhood Chaos:
1. How many different homes or apartments did you live in before you started first grade?
2. About how many elementary schools did you attend?
3. How many different primary caregivers did you live with (for at least a month), before you started first grade?

Middle Childhood Chaos:
1. How many different homes or apartments did you live in from first grade through 11 years of age?
2. About how many elementary schools did you attend?
3. How many different primary caregivers did you live with (for at least a month), from first grade through 11 years of age?

Late Childhood Chaos:
1. How many different homes or apartments did you live in from the time you turned 12 until now?
2. About how many different schools did you attend in that time?
3. How many different primary caregivers did you live with (for at least a month) from the time you turned 12 until now?

All Chaos:
Any one exposed to early, middle, or late childhood chaos of over 6 on a range of 0 to 15.

*This study changed the value of 1 in the original data (which was defined as having one stable residence, caregiver or caregiver pair, or school) to a 0 in order to assist in the binary differentiation of stability and instability.

Distribution for the variable before data cleaning was as follows (with 554 missings):

Early Childhood Changes Distribution		
Number of Changes Experienced	Frequency	Cumulative Percentage
3	131	16.4
4	190	40.1
5	188	63.6
6	101	76.3
7	67	84.6
8	56	91.6
9	33	95.8
10	15	97.6
11	12	99.1
12	3	99.5
13	2	99.8
14	0	99.8
15	2	100
Median=5	Mean=5.36	St.Deviation.=2.03

Middle Childhood Changes Distribution		
Number of Changes Experienced	Frequency	Cumulative Percentage
3	97	12.1
4	143	30
5	163	50.4
6	120	65.4
7	105	78.5
8	61	86.1
9	40	91.1
10	27	94.5
11	27	97.9
12	7	98.8
13	3	99.1
14	4	99.6
15	3	100
Median=5	Mean=5.96	St.Deviation=2.33

Late Childhood Changes Distribution		
Number of Changes Experienced	Frequency	Cumulative Percentage
3	47	5.9
4	98	18.1
5	118	32.8
6	126	48.6
7	110	62.3
8	87	73.2
9	59	80.5
10	62	88.3
11	49	94.4
12	12	95.9
13	12	97.4
14	10	98.6
15	11	100
Median=7	Mean=7.04	St.Deviation=2.70